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No. 04-1470

Supreme Court, U.S.
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IN THE

Supreme Court of the United States

THE ESAB GROUP, INC.,

Petitioner,

v.

CENTRICUT LLC (NEW HAMPSHIRE)
and CENTRICUT LLC (DELAWARE),

Respondents.

ON PETITION FOR A WRIT OF CERTIORARI TO THE
UNITED STATES COURT OF APPEALS
FOR THE FEDERAL CIRCUIT

BRIEF IN OPPOSITION

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QUESTIONS PRESENTED

1. Whether the Federal Circuit adopted a "new standard" usurping the role of the trier of fact, or merely correctly applied the "clearly erroneous" standard of Fed. R. Civ. P. 52(a) in reversing the Trial Court's finding of infringement?

2. Whether the Federal Circuit correctly held that ESAB failed to meet its burden of proof on infringement because it failed to present relevant expert testimony?

PARTIES TO THE PROCEEDING AND RULE 29.6 STATEMENT

The Respondents in this case are Centricut LLC (New Hampshire) and Centricut LLC (Delaware). Centricut LLC (New Hampshire) is in dissolution. Centricut LLC (Delaware) is a wholly owned subsidiary of Hypertherm, Inc.

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STATEMENT OF THE CASE

Centricut, LLC (New Hampshire) sought a declaratory judgment that it did not infringe United States Patent No. 5,023,425 ("'425 patent") of ESAB Group, Inc. ("ESAB"). ESAB counterclaimed for infringement against Centricut, LLC (New Hampshire) and its successor, Centricut, LLC (Delaware) (collectively, "Centricut"). After a bench trial, the Court found infringement by Centricut, and awarded ESAB over $2 million in damages. App. 17a.[1] The Court also permanently enjoined Centricut against future infringement. A83.[2] On appeal, the Federal Circuit reversed, holding that ESAB had failed to meet its burden of proof on infringement, because it failed to present relevant expert testimony. App. 2a. ESAB's combined petition for panel rehearing and rehearing *en banc* was denied. App. 44a.

Centricut manufactured and sold oxygen electrodes for replacement use in plasma arc torches of various manufacturers, including ESAB. *See* A296-99, 349, 944-45. Plasma is a high-temperature, ionized gas used in cutting metals; it supports an electrical arc between the torch and the metal being cut. *See* '425 Patent, Col. 1, L. 9-13 (A106). Electrodes are "consumables"; i.e., they wear out with use and must be replaced periodically. A944-45.

At issue on appeal was Independent Claim 1 of the '425 Patent, in which the following is claimed:

> 1. An electrode adapted for supporting an arc in a plasma arc torch and comprising a metallic holder having a front end, and a cavity in said front end, and an insert assembly mounted in said cavity and

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1. References to "App. __" are to the appendix to ESAB's Petition for Writ of Certiorari.

2. References to "A__" are to the appendix filed with the Federal Circuit.

> comprising an emissive insert composed of a metallic material having a relatively low *work function*, and a sleeve surrounding said emissive insert so as to separate said emissive insert from contact with said holder, said sleeve having a radial thickness of at least 0.1 inches at said front end and being composed of a metallic material having a *work function* which is greater than that of the material of said emissive insert, and said sleeve being composed of a metal which is selected from the group consisting of silver, gold, platinum, rhodium, iridium, palladium, nickel, and alloys wherein at least 50% of the composition of the alloy consists of one or more of said metals and whereby said sleeve acts to resist movement of the arc attachment point from said insert to said holder.

A109 (emphasis added).

At the bench trial, the principal issue concerned the work-function limitation.[3] "Work function is an energy. It's the energy that's required to remove an electron from inside the material to outside the material."[4] App. 6a. Finding that the accused electrode contained a "sleeve" with a higher "work function" than its "emissive insert," the Trial Court ruled that Centricut's electrode literally infringed Claim 1of the '425 Patent. App. 21a-22a.

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3. Centricut had previously moved for summary judgment, arguing, among other things, that its accused electrode did not include the "cavity" or "sleeve" limitation. However, ruling to the contrary in its claim construction, the Court denied Centricut's motion. A18-30.

4. This is how the Federal Circuit correctly described the term. App. 6a.

REASONS FOR DENYING THE PETITION

I. THE FEDERAL CIRCUIT DID NOT ADOPT A "NEW STANDARD" USURPING THE ROLE OF THE TRIER OF FACT, BUT MERELY CORRECTLY APPLIED THE "CLEARLY ERRONEOUS" STANDARD OF FED. R. CIV. P. 52(a) IN REVERSING THE TRIAL COURT'S FINDING OF INFRINGEMENT.

A. Overview

This case presents no "new standard" (ESAB Petition, Questions Presented) under which the role of a trier of fact is usurped by an appeals court. Rather, it presents an orthodox and wholly correct application of the "clearly erroneous" standard of Fed. R. Civ. P. 52(a). "A petition for a writ of certiorari will be granted only for compelling reasons." Sup. Ct. R. 10. Here, there are none.

The Federal Circuit correctly held that the Trial Court committed clear error (Fed. R. Civ. P. 52(a)) in its reliance on so-called work-function tables (App. 8a-10a) — an error that ESAB does not even mention. Also unmentioned by ESAB is the fact that the Trial Court pointedly rejected the arguments ESAB now makes (*see* Argument IC, below), a rejection the Federal Circuit upheld. App. 13a-14a. In short, the Trial Court was clearly wrong in its reliance on the work-function tables, but right in its rejection of ESAB's present arguments — now being made for the fourth time.[5]

ESAB failed to meet its burden of proof that the claimed work-function element, or its substantial equivalent, was present in the accused Centricut electrode. "It is well settled that each element of a claim is material and essential, and that in order

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5. First, at trial (*see* Argument IC); second, in its brief to the Federal Circuit (at 3-31 — *n.b.* 3-8, 16-17, and 24-31); third, in its petition for rehearing *en banc* to the Federal Circuit (at 2, 5-6, and 10-15).

for a court to find infringement, the plaintiff must show the presence of every element or its substantial equivalent in the accused device." *Lemelson v. United States*, 752 F.2d 1538, 1551 (Fed. Cir. 1985). ESAB tried to prove the work-function element through witnesses who not only lacked work-function expertise but *admitted* lacking it. This obvious failure of proof was sharply rejected by *both* the Trial Court *and* the Federal Circuit.

Yet, incredibly, it is on this very issue — on which the Trial Court and Federal Circuit completely agreed — that ESAB argues the Federal Circuit "usurped" the role of the trier of fact. The argument is false.

B. Fed. R. Civ. P. 52(a)

ESAB misconceives what the Federal Circuit did. It did not sit as a Trial Court, according varying degrees of "weight" to the testimony of the different witnesses. Rather, it reviewed, as it had to, the entire evidence to determine whether the Trial Court's finding of infringement of the '425 Patent was "clearly erroneous" under Fed. R. Civ. P. 52(a). As this Court has said: "A finding is 'clearly erroneous' when although there is evidence to support it, the reviewing court on the entire evidence is left with the definite and firm conviction that a mistake has been committed." *United States v. U.S. Gypsum Co.*, 333 U.S. 364, 395 (1948).

Here, the "entire evidence" includes a conspicuous omission. No evidence whatsoever was adduced of either the *actual* work-function values or the *actual relative* work-function rankings in the accused Centricut electrode. This was ESAB's burden to prove; and its failure was total. *Lemelson*, 752 F.2d at 1551. "Indeed, neither party introduced evidence of tests or other evidence concerning the exact materials used in the accused device."[6] App. 7a.

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6. To say, as ESAB does (at 5), that the accused device used hafnium for the insert and silver for the sleeve is imprecise and (Cont'd)

The "entire evidence" includes one and only one work-function expert: Centricut's expert, Professor Marten denBoer, a tenured full professor of physics at the City University of New York and its Graduate School. A639-45, 1292-1305. No other witness was a work-function expert. Although Professor denBoer is a physicist, the meaning of work function in physics is the same as it is in engineering — a point acknowledged by the engineer-inventor of the device claimed in the '425 Patent. A186. Professor denBoer "testified that it was not possible to determine the relative work functions of the sleeve and the emissive insert of the accused device without direct testing because many factors affect the work function of a surface."[7] App. 7a. Significantly, however, no such testing was done. *Id.*

ESAB argues:

> The approach adopted by the Federal Circuit had the direct effect of *improperly usurping the role of the trier of fact.* [ESAB Petition, at 2 (emphasis added).]

> It is well settled that . . . original findings of fact by the district court may not be set aside unless clearly erroneous, and that "*due regard" must be given to the opportunity of the trial court to judge the credibility of witnesses*. . . . The rationale underlying the requirement of *due deference to a district court's original findings is grounded* . . . [in part] *in the district court's ability to observe the demeanor of witnesses firsthand*. . . . [At 11-12 (emphasis added).]

(Cont'd)

inadequate. The hafnium and silver were not pure, but alloyed. As the Federal Circuit correctly observed, the "exact materials used in the accused device" (App. 7a) were never proved. *Id.*

7. As the Federal Circuit noted, Professor denBoer also "testified that work function is a product of specific surfaces, not of specific elements as represented in the tables." App. 11a.

The panel should not have adopted its new framework . . . under which it is permitted to engage in original fact finding (and then on a selective weighing of the evidence), contrary to the district court's original decision. [At 17 (emphasis added).]

[T]he panel's decision entirely disregarded the testimony of knowledgeable, experienced witnesses (including adverse witnesses in particular) actively engaged in the field of plasma cutting. The testimony was disregarded, in material part, on the basis that the relevant witnesses were not "expert in the field." [At 18 (emphasis added).]

[T]he framework adopted by the Federal Circuit panel in the present appeal must be set aside in favor of an approach that permits the trial court to take all relevant evidence into account, including the testimony of those knowledgeable in the relevant field of endeavor. [At 22 (emphasis added).]

One might infer from ESAB's arguments that the Trial Court credited certain testimony, and that the Federal Circuit supplanted the Trial Court's assessments with its own. Nothing could be further from the truth. The arguments that ESAB makes here — based on "the testimony of knowledgeable, experienced witnesses (including adverse witnesses in particular) actively engaged in the field of plasma cutting" (at 17) — are the very same arguments that it made to the Trial Court, to the Panel, and to the Court *en banc*. *See* Argument IC, below; ESAB's brief to the Federal Circuit (at 3-31 — *n.b.* 3-8, 16-17, and 24-31); and its petition for rehearing *en banc* to the Federal Circuit (at 2, 5-6, and 10-15). *See also* A922-24. However, the

Trial Court rightly *rejected* those arguments, calling them "very unscientific" (A924), as indeed they are. The Federal Circuit agreed. App. 13a-14a, 44a. On this point, therefore, the Trial Court and the Federal Circuit are one.

C. ESAB's "Very Unscientific" Argument

In ESAB's brief to the Federal Circuit (at 3-31 — *n.b.* 3-8, 16-17, and 24-31) and its petition for rehearing to the Court *en banc* (at 2, 5-6, and 10-15), ESAB cited extensively to the testimony of non-experts on work function.[8] However, as both the Trial Court and the Federal Circuit correctly recognized, and as each of the ESAB-cited witnesses so clearly demonstrated, knowledge of plasma cutting is emphatically *not* the same thing as knowledge of work function. Hence, both the Trial Court and the Federal Circuit properly concluded that ESAB's reliance on these non-experts was improper.[9]

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8. Much of ESAB's argument was, and is, couched in terms of "emissivity." But as Professor denBoer explained, emissivity is not the same thing as work function. (A669.) "They are related, but not the same." (*Id.*) "Emissivity is, in science, the propensity of the surface to emit, in this case, electrons." (*Id.*) "[W]ork function is the energy barrier that an electron needs to surmount to be emitted from the surface. . . ." (*Id.*) Professor denBoer also explained that "thermionic emission" and "thermionic emissivity" are related to work function, but are not the same as work function. (A668-70.) Again, as the Federal Circuit correctly said, "'Work function is an energy. It's the energy that's required to remove an electron from inside the material to outside the material." App. 6a. ESAB is therefore simply wrong when it argues, "the panel's decision expressly acknowledges that 'work function' is the measure of the ability of a metal to emit electrons (i.e., 'emissivity')."

9. It was the obvious, indeed admitted, lack of expertise of these witnesses that caused both the Trial Court and the Federal Circuit to reject ESAB's arguments. It emphatically was *not* the case, as ESAB now argues, that the "panel dismissed all other probative factual testimony *ostensibly on the basis that much of the testimony was couched in terms of the relative 'emissivity' of the disputed materials, hafnium and silver, rather than expressly in terms of work function*." At 13 (emphasis added).

Consider what the Trial Court said:

THE COURT: Yeah, if you're trying to use this witness [Mr. Landry] to establish that scientific fact, I can't let do you that. He disclaims any knowledge or expertise in the area. You didn't disclose him as an expert witness in that field. If that's your point, I can't let you do that.

MR. ARROYO: But your Honor, he's a witness also on behalf of the defendant and officer of the company. It's an admission that we can use in the case as evidence that can be used against Centricut without any, I mean, presuming —

THE COURT: Your job, again, I may be oversimplifying it, but I think I warned you many times prior to trial, you've got to simplify it. Your job is to prove that their accused device uses a silver insert at a higher work function than the emitter and the surrounding copper holder. That's your job, right? Haven't we brought it down to that, and so arguing with this witness about what he may or may not have subjectively understood about a process he never studied and hasn't been disclosed as an expert on this I guess is interesting and you can build your record if you want to do that for purposes of appeal within reasonable limits, but it's not moving the ball much.

MR. ARROYO: But your Honor, it is part of our proof. As I said, thermionic emissivity and work function are reciprocals of each other.

THE COURT: So say you, so say you, and maybe you will have some evidence that will back that up that [sic]. You're not a witness and you're not giving evidence in the case. If you're saying to me that's what I want this fellow to do, I can't let you do that. He's not a disclosed expert on the reciprocal nature of the thermionic emissions and high work function, he

hasn't been disclosed on that subject matter, he's demonstrated no expertise in the area, in fact he's disclaimed expertise in the field. He's got a two-year degree from a vocational technical school and says he never studied it in any capacity, so how can I possibly let you use him to establish that fact if that's what you're trying to do? You've got to get somebody qualified to do it and you have to have disclosed him. [A444-46.]

MR. ARROYO: All right, do you understand what the nature is of the testimony we are offering at this point in terms of the relationship between emissivity and work function?

THE COURT: I understand what your theory is, and I also understand that you're trying to extract it from witnesses that don't subscribe to your theory. I understand that.

MR. ARROYO: And by extracting it, I would hope, your Honor, that by extracting it from adverse witnesses it will make the point more soundly established.

THE COURT: But you have a basic legal problem of proof of evidence, which is he is not an expert. He's not qualified as an expert, not disclosed as an expert, disclaims expertise in the field, so that he might be persuaded to say that there's a physics equivalent here, probably wouldn't be persuasive. A, you can't use him for that purpose. You didn't disclose him as an expert. B, he's not an expert, he's not qualified to give that opinion testimony. He in fact disclaims, as I understand his testimony, he disclaims any expertise in the field of work function, so if he were to stumble into saying yes, high transfer heat rate equals low or

high work function or whatever, it doesn't move the ball, it's not reliable evidence.

MR. ARROYO: Your Honor, certainly we can agree that if a witness is an adverse party, the people in responsibility admit statements that the admissions of a party may be used in a case for all purposes —

THE COURT: Not uninformed admissions on matters of expertise, not opinions, not unqualified opinions. You get somebody on the stand to say flies come from rotten meat and I have to accept that because he's admitted it? Hardly. That's junk science as you like to point out.

MR. ARROYO: When it's admitted as a basic fact throughout the case —

THE COURT: No, no, it's not a basic fact, see, that's the problem, that's the problem, it's not a basic fact. It's not a basic fact. It's a scientific fact. So it's not a basic — it's not who did what, when, where, how. It's a principle of science that has to be proven through expert witnesses usually. [A458-60.]

ESAB cites to the testimony of Mr. Couch (at 6-7, 19-20), the CEO of Hypertherm, Centricut's parent company, calling him the "wizard of plasma." At 6, n. 2. Yet as to his own inexpert understanding of the science relating to work function, he testified as follows:

I don't understand the physical chemistry of those two materials in this oxidizing atmosphere. I don't understand it. [A913 (emphasis added).]

I really — we, as a manufacturer of this type of product or any products, want to understand the underlying

physics of what is going on, and we don't. And we have research work underway to try to understand it better, but we right now don't. [A914 (emphasis added).]

Q. *Mr. Couch, how well do you understand thermionic emissivity?*

A. *I understand it very poorly.* [A906 (emphasis added).]

ESAB also cites to the testimony of Mr. O'Hara (at 6), Centricut's expert on invalidity (an issue Centricut did not appeal). Yet as to his own inexpert understanding of the science relating to work function, he testified that he had never used work function as a criterion for designing an electrode, emissive insert, holder, or any other electrode-component for an air or an oxygen environment; never studied work function in high school, college, graduate school, or any academic setting; and had only a limited understanding of work function. A276-78. Moreover, Mr. O'Hara specifically denied that he had any understanding of ESAB's asserted reciprocal relationship between work function and emissivity (A242); indeed, he testified, "I did not relate work function and emissivity." A243.

Again, ESAB made essentially the same arguments at trial and to the Federal Circuit that it makes here — referring to, among other things, emissivity and the testimony of "Messrs. Landry, O'Hara, etcetera" and Mr. Couch. *See* A922-24; *see also* ESAB's brief to the Federal Circuit (at 3-31 — *n.b.* 3-8, 16-17, and 24-31) and its petition for rehearing to the Court *en banc* (at 2, 5-6, and 10-15). But as stated above, the Trial Court correctly recognized these arguments as "very unscientific":

THE COURT: You know, *that argument troubles me because it seems very unscientific. "It must be so because it works." No. It works. Why it works, who knows.*

MR. ARROYO: Your Honor, —

THE COURT: You don't throw a hypothesis out there and then say, my hypothesis [is] proved because it works — *you haven't isolated anything.*

MR. ARROYO: Your Honor, when —

THE COURT: Of course, *who knows why it works. Why isn't it equally true that it works because you have a heat sink function? That's why it works.*

MR. ARROYO: One of the difficulties here, your Honor, and you will recall when the —

THE COURT: In other words, *your proposition is because their electrode works, necessarily the silver has a higher work function. Necessarily. Because otherwise it wouldn't work. But there's competent evidence that, no, it works because it keeps the emissive insert cooler. That's why it works. Not because of any arc migration discouragement. Not at all.* I don't know. How do I know? [A924-25 (emphasis added).]

The Court's trial insight into ESAB's lack of proof was correct, but impermanent. Where the Trial Court went wrong, however, was *not* in adopting ESAB's present arguments; it never did. Where the Trial Court went wrong — indeed, clearly wrong — was in its post-trial decision,[10] in which it professed to rely on the work-function tables to find infringement. App. 22a, n. 4.

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10. The Trial Court's decision was issued 8½ months after trial. App. 42a; A850 and 993.

D. The Work-Function Tables

The Trial Court's clearly erroneous finding of infringement purported to rest on the work-function tables:

> [I]t is clear from the scientific references . . . [i.e., the work-function tables] that *silver commonly has a higher work function than hafnium*. Nothing in the record suggests that Centricut made its silver sleeves from *one of the relatively few low-work-function forms of silver*. It is more likely than not that the accused electrodes' sleeves were made from *common forms* of silver having a higher work function than hafnium [used for the emissive insert]. [App. 22a, n. 4 (emphasis added).]

However, no evidence was evidence adduced — let alone expert evidence — that any of the work-function tables contained "typical" or "common" work-function values for silver. Thus, the Trial Court's statement that "silver commonly has a higher work function than hafnium" (*id.*) has no evidentiary support whatsoever, let alone any expert evidentiary support.

The Federal Circuit accurately summarized the evidence on the work-function tables as follows:

> [T]he district court found the work-function tables showed that the accused device met the work-function limitation by a preponderance of the evidence, even though the only expert testimony directly contradicted this conclusion.
>
> Centricut called as its witness Dr. Marten denBoer, a physics professor who was qualified as an expert witness on the issue of work function. He filed an expert report to which a number of work-function tables from various scientific reference books were appended. The tables reported the measured work functions of samples of various pure metals, including silver and hafnium.

> In the report, Dr. denBoer attempted to rank the work functions of copper, hafnium, and silver. He concluded that "tabulated values of . . . work function are . . . of limited value in attempting to rank work functions of specific materials" because many factors affect the work function of a surface. (J. A. at 1335.) Dr. denBoer's subsequent testimony and affidavits supported his conclusion in the report that reference to work-function tables is an unreliable way to rank the work functions of specific materials. In particular, he testified that work function is a property of specific surfaces, not of specific elements as represented in the tables. He also testified that the tables were prepared under much different conditions than a torch in operation and that these differences in conditions greatly impact the work function measurement. He concluded that the tables were not probative as to the relative work functions in the actual accused device. [App. 10a-11a].

At the Federal Circuit, ESAB stayed away from the work-function tables — and with good reason. Other than a short reference to them in its brief to the Federal Circuit (at 27, n. 7), ESAB did not even mention the work-function tables. As the Federal Circuit said, "Esab barely mentions the work-function tables in its brief. Esab points to no expert testimony or contrary testimony [to Professor denBoer's] supporting the use of the tables." App. 11a.

And in its petition for rehearing *en banc*, ESAB continued to stay away from the work-function tables. Its tack was essentially the same as it had been before the Panel. Not only did it fail to tell the Court *en banc* that the Trial Court had sharply rejected its central argument; it also said nothing about the actual basis for the Trial Court's finding of infringement — the work-function tables.

Thus, at the Federal Circuit, rather than stand foursquare behind the Trial Court's rationale, ESAB left it alone. That *non*-endorsement spoke, and speaks, volumes. It amounted, and amounts, to an implicit acknowledgment of the clear error of the Trial Court's rationale. On this, ESAB was right.

But in its petition to this Court, ESAB changes tack for the first time. Now, it refers to the tables (at 5, 8 n. 4, 15, and 16),[11] and makes the following argument (at 15):

> As noted, the district court found that Esab had satisfied its burden of proof by a preponderance of the evidence by reference to published work function values that *consistently ranked silver as having higher work function than hafnium*. The panel dismissed the relevance of this additional evidence, also on the basis of a selected excerpt of denBoer's testimony, in which he indicated *that the reported measurements were generally obtained under conditions that were different from those prevailing in an operating plasma cutting torch*. App. 11a.
>
> *There was no dispute that the measured work function values presented in various reference tables were accurate* and resulted from comparable measurements or assigned valves. This was conceded in an earlier affidavit submitted by denBoer. A. 1292 ¶3 ("Such values are accepted for purposes of comparison, for example, in checking calculations of work functions, under *certain specific experimental conditions, normally involving clean metals at room temperature under ultra-high vacuum*.") [Emphasis added.]

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11. At pp. 5 and 15, however, ESAB does not use the word "tables," but instead refers to them as "reference texts" and "published work function values."

ESAB's new argument on the work-function tables should fail for waiver, since it was not raised with the Federal Circuit.[12] *See, e.g., United States v. Ortiz*, 422 U.S. 891, 898 (1975) (declining to consider issue that petitioner had not raised with appeals court). And it certainly fails for at least two other reasons.

First, ESAB's statement that "published work function values . . . consistently ranked silver as having higher work function than hafnium" is like the Trial Court's statement that "silver commonly has a higher work function than hafnium." App. 22a, n.4. Again, no evidence was evidence adduced — let alone expert evidence — that any of the work-function tables contained "typical" or "common" work-function values for silver. Thus, whatever "consistency" might appear on the face of some tables is meaningless. Furthermore, there are inconsistencies, as the Federal Circuit noted:

> The work-function tables reported work-function values for numerous elements. Many of the tables before the court provided data on multiple samples of the same element using multiple methods for measuring work function. For example, one table reports sixteen work-function values for silver ranging from 3.08-4.81eV. (J.A. at 1361.) The same table reported a single range of 3.53eV for hafnium. (*Id.* at 1362.) On this table, one of the work-function values reported for silver was less than the work-function value reported for hafnium. [App. 8a, n.3.]

Most fundamentally, to quote ESAB's paraphrase (at 15) of Professor denBoer, "the reported measurements [in the work-function tables] were generally obtained under conditions that were different from those prevailing in an operating plasma

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12. Nor was it even raised with the Trial Court, to the best of Centricut's knowledge and belief, based on its review of ESAB's Proposed Findings of Fact and Conclusions of Law and its related Post-Trial Memorandum.

cutting torch." Those differences are striking. As Centricut said in its brief to the Federal Circuit (at 16-17):

> To sum up on the work-function tables: in resting its finding solely on them, the Court clearly failed to take into account the following: (1) that the tables are based on conditions normally involving metals that are pure, clean, at room temperature, and under ultra-high vacuum; (2) that, in stark contrast, the "critical time" for determining work function for purposes of the '425 Patent is during "actual operation" — (a) when in the case of the components of the accused electrode, the metals are alloyed — not pure, (b) when the metals' surfaces are oxidized — not clean, (c) when the temperature is 30,000 degrees K[elvin] — not room temperature, and (d) when the environment is an oxidizing environment — not an ultra-high vacuum; (3) that those very oxidizing conditions will cause the work function of a *silver* surface to *fall* and the work function of a *hafnium* surface to *rise*; and (4) that for these reasons, *work function is now understood to be a variable, determined by the particular atomic arrangement of the surface under examination, and not an intrinsic property of a material.* [Emphasis added.]

Second, when ESAB says, "There was no dispute that the measured work function values presented in various reference tables were accurate," it is not merely wrong, but outrageously wrong. Centricut emphatically disputed the tables' accuracy for the purpose of determining infringement. Their glaring *un*reliability for this purpose was a critical part of Centricut's case, both at trial and on appeal. *See, e.g.,* Centricut's brief to the Federal Circuit at 6-18, 20-23.

Although it is true that Professor denBoer said, "Such values are accepted for purposes of comparison, for example, in checking calculations of work functions, under *certain specific*

experimental conditions, normally involving clean metals at room temperature under ultra-high vacuum" (A. 1292 ¶3), those conditions are starkly different from the conditions under which a plasma torch operates. For the reasons summarized at the end of the preceding paragraph, they provide absolutely no reliable basis for a finding of infringement.[13]

Indeed, ESAB itself acknowledges Professor denBoer's criticisms of the work-function tables:

> While denBoer criticized these measurements as not necessarily indicative of the actual work function values under torch operating conditions, he also did not propose any practical method for obtaining a direct measure of these values for hafnium and silver under the operating conditions of 30,000°K., nor did he offer any opinion that hafnium had a higher work function under prevailing torch operating conditions in fact. [At 16.]

Part of that statement betrays ESAB's persistent misconception about the burden of proof. It was ESAB's burden, not Centricut's, to present a "method for obtaining a direct measure of these values for hafnium and silver under the operating conditions of 30,000°K," or to present some other reliable scientific evidence from which infringement could be proved. This, however, ESAB utterly failed to do.

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13. ESAB is also outrageously wrong when it says, "There is also *undisputed testimony* that even if the hafnium insert material is positioned well off center in the holder material, the electric arc still emits off of the hafnium surface as a further indication of its lower work function under operating conditions. A. 223 (17-25)." At 16 (emphasis added). That point was hotly disputed. Professor denBoer testified diametrically to the contrary, saying among other things: "[I]t's the motion of the gas that's most decisive in determining where the arc emits from, and therefore even if the center were silver and the surround were hafnium, . . . then the arc would continue to emit from the silver." A720-21. *See also* A716-22 (denBoer) and A880-84 (Couch).

II. THE FEDERAL CIRCUIT CORRECTLY HELD THAT ESAB FAILED TO MEET ITS BURDEN OF PROOF ON INFRINGEMENT BECAUSE IT FAILED TO PRESENT RELEVANT EXPERT TESTIMONY.

The work-function piece of this case might have been entirely different *if*: (1) ESAB had offered an expert on work function; *and* (2) that expert had given evidence, contrary to Professor denBoer's, that the work-function tables *are* scientifically reliable for proving infringement here, or that some other scientific basis existed to support ESAB's claim of infringement of the work-function element. *Neither* happened, however.[14]

Fed. R. Evid. 702 provides:

> If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness *qualified as an expert* by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise, *if* (1) the testimony is based on *sufficient facts or data*, (2) the testimony is the product of *reliable* principles and methods, *and* (3) the witness has applied the principles and methods *reliably* to the facts of the case. [Emphasis added.]

Note also the Advisory Committee Notes to the 2000 Amendment to Fed. R. Evid. 701: "Rule 701 has been amended to eliminate the risk that the *reliability requirements* set forth in Rule 702 will be evaded through the simple expedient of proffering an expert in lay witness clothing." (Emphasis added.)

ESAB's efforts to evade the reliability requirements of Rule 702 rightly failed. Both the Trial Court and the Federal Circuit

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14. ESAB refers (at 19, n. 12) to the designation of "experts" (plural). But the only expert it designated was a patent agent, who had no work-function expertise and did not even give evidence at trial.

were correct in rejecting ESAB's "very unscientific" arguments based on non-expert testimony. As the Federal Circuit said:

> By agreement of the parties, the district court construed the term "'work function' as 'the potential step, measured in electron volts, which permits thermionic emission from the surface of a given material.'" . . . "Work function is an energy. It's the energy that's required to move an electron from inside the material to outside the material." [App. 6a.]

> Indeed, in this case the technology involved was complex. The district court concluded that "the field of technology from which [the invention] sprang is so poorly understood that it qualifies as a 'black art.'" [App. 14a, 29a n.6.]

"Work function" is thus a scientific matter or, at the least, a matter requiring technical knowledge or "other specialized knowledge." Rule 702. But ESAB met *none* of Rule 702's requirements: it had *no* witness who qualified as an expert on work function, let alone one who testified on the basis of "sufficient facts or data" (the inventor, for example, did not even know the source of the data for the work-function chart presented in Col. 4 of the '425 Patent (A187-88, 107)), or on the basis of "reliable principles and methods," or by applying such "facts and principles reliably to the facts of the case."

However, while rightly rejecting ESAB's "very unscientific" reasoning, the Trial Court succumbed to its own, through its misuse of the work-function tables — a clear mistake, as the Federal Circuit fully recognized. In thus running afoul of Rule 702, the Trial Court also ran afoul of this Court's teachings in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993); *General Electric Co. v. Joiner*, 522 U.S. 136 (1997);

Kumho Tire Co. v. Carmichael, 526 U.S. 137 (1999); and *Weisgram v. Marley Co.*, 528 U.S. 440 (2000).[15]

Under *Daubert*, "the trial judge *must ensure* that any and all scientific testimony or evidence admitted is not only relevant, but *reliable*." 509 U.S. at 589 (emphasis added). *Kumho Tire* applies the same standard to technical or other specialized knowledge. 526 U.S. at 148. Here, the Trial Court relied on scientific evidence — the work-function tables — that *no* expert witness said was "reliable," and the one and *only* expert witness said was *un*-reliable for ranking the work-function values in the accused electrode.

Ironically, although the Court's post-trial decision was incorrect, its trial comments reflected that it correctly apprehended ESAB's failure to meet its burden of reliable scientific proof. For example, during the final day of trial, after the close of ESAB's direct case and while addressing Centricut's motion for judgment as a matter of law, the Court made the following comments to ESAB's counsel:

> THE COURT: No, but it would have been nice to have a witness come in here and say, I'm an expert in physical science and I've tested their device and this is the device I tested and it's theirs, and I measured the work function of the silver in terms of its thermionic emissivity measured in electron volts, and guess what, it's higher. That would have been nice. . . . So, you know, we didn't try it that way, but there might have been an easier way

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15. The fact that this was a bench trial rather than a jury trial is no bar to applying the rationale of *Daubert* and its progeny. That case law applies not only to issues of *admissibility*, but also to issues of *weight* of the evidence. *Libas, Ltd. v. United States*, 193 F.3d 1361, 1366 (Fed. Cir. 1999). *Accord, Elliott v. Commodity Futures Trading Commission*, 202 F.3d 926, 934 (7th Cir. 2000). *See Mitchell v. United States*, 141 F.3d 8, 14-17 (1st Cir. 1999); and *cf. Perez-Trujillo v. Volvo Car Corporation (Sweden)*, 137 F.3d 50, 52, n.5 (1st Cir. 1998). Moreover, Rule 702 itself is couched in terms of the "trier of fact."

to try it. So here we are on this long, winding, inferential, deductive road. And what you're going to have to do is, since you don't have a little completed picture for me and all you have is these puzzle pieces, you're going to have to put those puzzle pieces together for me. [A927-28 (emphasis added).]

THE COURT: Sure. And I'm sitting here asking myself a simple question. *Does their device have that? Have what? Does it have a silver sleeve surrounding the emissive insert that has a higher work function than the emissive insert* in the copper. Does it have that? *No one has gotten on this stand and said, yes, it does because I've tested it.*

MR. ARROYO: Your Honor, I submit to you that no one has to get on the stand and say that they've tested it.

THE COURT: Okay. You're right.

MR. ARROYO: They all come in and admit that they designed it.

THE COURT: *You could get on the stand and say, we don't have to test it because by definition, silver has a higher work function than hafnium and by definition, silver has a higher work function than copper. But nobody seems to be willing to say that either.* [A931 (emphasis added).]

THE COURT: I'm sure they work. I'm sure they work, but that doesn't necessarily answer the question. Skipping ahead — I'm not going to consider this on the motion, but *Dr. [den]Boer says, I don't know.*

> *Nobody can tell you. Nobody can tell you. Silver can have a work function much lower than the hafnium. Hey, I don't know, but he's a physicist. He's the only expert that's testified on that subject, and he said silver can have a work function lower than hafnium. Once that comes into play, shouldn't there be some evidence that this particular silver doesn't*? [A933 (emphasis added).]

> THE COURT: No, there's no problem — *that's a red herring issue. There's no problem with the definition of the invention. The problem is a problem of proof.* It's not even a question of substance. *It's a question of proof. What's your proof in this courtroom to demonstrate that their device infringes*? We're in the court world now. *So this is a question of what do you have on your scale that tends to prove, more probably than not, that their silver in their accused device has a higher work function than the emissive insert in the copper and/or the copper holder? What is it? And what you seem to be saying is, well, because it works, and it wouldn't work if it didn't have a higher work function.* Because it's designed to work and it wouldn't be designed to work unless the emissive insert had a lower work function. [A934-35 (emphasis added).]

Again, the Court's trial insight into ESAB's lack of proof was correct, but impermanent. Its erroneous post-trial Order to the contrary may be examined in light of what this Court once said about inadequate scientific proof:

> [N]othing in either *Daubert* or the Federal Rules of Evidence requires a district court to admit opinion evidence which is connected to existing data only by the ipse dixit of the expert. A court may conclude that there is simply too great an analytical leap between the

> data and the opinion offered. . . . [T]he studies upon which the experts relied were not sufficient, whether individually or in combination to support their conclusions. . . .

Joiner, 522 U.S. at 146-47. Here, there is not even the "ipse dixit" of an expert to "connect[] the existing data" (the tables) to the Court's conclusion. There is *nothing* — except the Court's *own* "ipse dixit." The work-function tables "upon which the . . . [Court] relied were not sufficient, whether individually or in combination to support . . . [its] conclusions." "[T]here is simply too great an analytical leap between the data" and the Court's finding of infringement.

The Federal Circuit held that "where the accused infringer offers expert testimony negating infringement, the patentee cannot satisfy its burden of proof by relying only on testimony from those who are admittedly not expert in the field." App. 15a. That is certainly correct. Centricut would respectfully submit, moreover, that even if it had offered *no* "expert testimony negating infringement," ESAB would *still* have failed to meet its burden of proof, and the Trial Court's decision should *still* have been reversed. *Weisgram* is instructive. There, this Court unanimously held that "the authority of the Court of Appeals to direct entry of judgment as a matter of law extends to cases in which, on excision of [expert] testimony erroneously admitted, there remains insufficient evidence to support the jury's verdict." 528 U.S. at 457. For ESAB on the work function issue, there was not even erroneously admitted expert testimony; there was no expert testimony at all. Thus, even if Professor denBoer's testimony were not part of the "entire evidence" (*U.S. Gypsum Co.*, 333 U.S. at 395), the Federal Circuit's decision should stand.

III. SINCE THE FEDERAL CIRCUIT CONFINED ITS DECISION TO THE INFRINGEMENT ISSUE AND DID NOT REACH ANY ISSUES OF CLAIM CONSTRUCTION, ESAB'S ARGUMENT II IS IRRELEVANT.

In its Argument II (at 18-22), ESAB addresses claim construction, saying among other things, "It is well settled under controlling decisions that the claims of an issued patent are construed as they would be understood by persons of ordinary skill in the relevant art." The statement is correct — but irrelevant.

"The determination of infringement is a *two-step process*. First, the Court construes the claims at issue to determine their scope. Second, it compares the properly construed claims to the accused device." *Intellectual Property Development, Inc. v. UA-Columbia Cablevision of Westchester, Inc.*, 336 F.3d 1308, 1313-14 (Fed. Cir. 2003) (emphasis added). Here, the Federal Circuit's decision was confined to the second step. No issues of claim construction were addressed.[16] As the Federal Circuit said: "There was *no dispute* concerning the district court's construction of the work function limitation. The question was whether the accused device satisfied the limitation."[17] App. 7a. (emphasis added).

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16. Centricut had also appealed the Trial Court's claim construction of the "cavity" and "sleeve" limitations. But the Federal Circuit did not reach them, saying, "On appeal, Centricut urges that the district court's construction of these claim limitations was also erroneous. In view of our disposition, we do not reach these issues, and accordingly do not discuss them further." App. 6a, n. 2.

17. ESAB is thus obviously incorrect when it says (at 7) that Centricut "conceded that its accused electrode corresponded to each of the elements of the asserted claims as previously construed by the court." Although ESAB qualifies the preceding statement with the words, "with the possible exception of the so-called 'work-function limitation,'" (Cont'd)

Not only is ESAB's claim-construction argument irrelevant, but it suffers from the same infirmities of the "very unscientific" argument that was rejected by both the Trial Court and the Federal Circuit. *See* Argument IC, above.

CONCLUSION

For the foregoing reasons, ESAB's Petition for a Writ of Certiorari should be denied.

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(Cont'd)
the qualification is an absurd understatement. The Federal Circuit's statement, quoted above, is accurate. The question whether Centricut's accused device in fact satisfied the work-function limitation was hotly disputed. It was the foremost issue at trial; it was the foremost issue on appeal.